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## SESSION V

### RESPONDING TO A SUSPECTED OR CONFIRMED YELLOW FEVER EPIDEMIC

- OBJECTIVES:** At the end of this lesson, participants will be able describe how to respond to a suspected or confirmed epidemic of yellow fever
- METHODS:** Lecture, discussion, small group exercise
- MATERIALS:** Prepared overhead projector transparencies, flipchart and pens
- PREPARATION:**
- \_\_\_ Practice lectures and put transparencies in order
  - \_\_\_ Review the information on clinical presentation and management of yellow fever in Chapter 2 and Section 4.9 of the *Guidelines*. Read Exercise 5 (it is used in Learning Activity 4). Adapt the suggested answers to the Exercise, if needed, to correspond to the level of equipment and training of the participants and those whom they supervise. Write the suggested answers in the copy of the exercise of this Facilitator's Guide.
  - \_\_\_ Re-read the article on Yellow Fever in the *Exercise Book* and make notes to prepare for the discussion in Learning Activity 4.
  - \_\_\_ Review the national experience in yellow fever control and make notes to prepare for the discussion in Learning Activity 4.

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#### LEARNING ACTIVITIES

2.5 hours

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##### 1. Introduction

Explain the topic and the objectives. Explain that the information given in this lesson is also found in Chapter 4 of the *Technical Guidelines on the Detection and Control of Epidemic Yellow Fever*.

##### 2. Lecture: How to Respond to a Suspected or Confirmed Epidemic of Yellow Fever

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Give a presentation on responding to an epidemic, using the prepared overhead projector transparencies. There are reduced versions of the transparencies on the following pages. There is space for you to write additional things you want to mention during the lecture.

Answer any questions.

# Response to an Epidemic of Yellow Fever

**CDC**  
Centers for Disease  
Control and  
Prevention

## **Steps in the Detection & Confirmation of Epidemic Yellow Fever**

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- **Health worker suspects YF**
- **Health facilities report suspected case(s) immediately**
- **District level conducts field investigation**
- **District level arranges for laboratory confirmation**

This slide reviews the steps for the detection and confirmation of an epidemic of YF

## **Response Steps When Yellow Fever is Confirmed**

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- 1. Convene epidemic committee**
- 2. Inform the public**
- 3. Conduct mass vaccination**
- 4. Control mosquitoes**
- 5. Treat patients**
- 6. Collect & report data / document epidemic**
- 7. Evaluate response - Plan for improvements**

## **Responsibilities Central Level-1**

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- **Plan and Formulate Policy**
- **Notify WHO of suspected epidemic and of laboratory confirmation**
- **Convene National Epidemic Committee**
- **Collect and Analyze Data - Provide Feedback to lower levels**

## **Responsibilities Central Level-2**

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- **Provide advice and assistance - assist in Field Investigations**
- **Acquire Supplies and Vaccine**
- **Conduct Epidemiological Studies**
- **Provide for funding**

## **District Level Responsibilities**

### **Surveillance and Detection**

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- **Surveillance for YF cases and epidemics**
  
- **Conduct field investigation**
  - **Send team to field**
  - **Collect and analyze data**
  - **Report on investigation**
  
- **Arrange for laboratory confirmation**

## **District Level Responsibilities Response**

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- **Convene epidemic committee**
- **Inform and educate the public**
- **Treat patients**
  - support health facilities
  - train health workers
  - arrange for Temporary Treatment Centers
  - inventory / order supplies

## **District Level Responsibilities**

### **Response - Vaccination**

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- **Rapid Mass Vaccination**
  - **Define target population**
  - **Calculate # doses needed**
  - **Request vaccine and supplies**
  - **Organize teams & cold chain**
  - **Conduct vaccinations**

## **District Level Responsibilities Response - Mosquito Control**

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- **Mosquito Control**
  - **Get advice of vector expert**
  - **Eliminate adult mosquitoes**
  - **Eliminate breeding sites**
  - **Recommend bed-nets**
  - **Educate public**

## **District Level Responsibilities**

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- **Monitor epidemic & control measures**
  - **Monitor:**
    - **number of cases & deaths**
    - **CFR and attack rates**
    - **geographic location**
  - **Monitor inventory of supplies**
  - **Monitor progress of vaccination**
  - **Determine need for assistance**

## **Responsibilities Health Facility Level**

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- **Recognize cases of suspected YF**
- **Report suspected cases immediately**
- **Collect information on patients**
- **Report daily during epidemics**
- **Treat patients**
- **Inventory treatment supplies**
- **Educate the public**

## **Epidemic Committee**

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- ▶ **Committees are needed at district, provincial & national levels**
  - fewer members needed at district level than at national level
  
- ▶ **Committees need decision making powers**
  
- ▶ **A separate YF committee not needed**
  - but a general epidemic committee should maintain competence in YF

## **Duties of Epidemic Committee - 1**

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- **Plan preparedness and control strategies**
- **Identify financing and resources needed for preparedness and control activities**
- **Define population at risk of yellow fever**
- **Identify competent laboratory support**

## **Duties of Epidemic Committee - 2**

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- **Assign specific responsibilities for detection and response**
- **Establish procedures for mobilizing vaccination campaigns rapidly**
- **Identify resources needed for rapid epidemic response**
- **Estimate / stockpile supplies needed**

## **Duties of Epidemic Committee - 3**

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- **Coordinate and monitor implementation of control measures**
- **Coordinate education of health care community and the public**
- **Evaluate impact of control measures, adjust strategy, review performance**
- **Report on the epidemic**

## **Members of Epidemic Committee -1**

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- **Ministry of Health**
  - *Administration*
  - *Communicable Diseases*
  - *Expanded Program on Immunization*
  - *Drug Supply and Distribution*
  
- **Other Ministries, as appropriate**
  
- **Armed Forces, Police, Border Officials**
  
- **NGOs involved in Health Care**

## **Members of Epidemic Committee - 2**

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- **Reference Laboratory**
  
- **Referral hospitals & hospitals in  
affected area**
  
- **Technical Experts**
  - *entomologists*
  - *vector control experts*

## **Response - What to Report**

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- **Number of cases and deaths**
- **Location of cases**
- **Dates of onset of disease**
- **Clinical details**
- **Action taken**

## **Response - Reporting During an Epidemic**

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### **Report:**

- **The time period for the report**
  - the epidemiological week or the dates
- **The number of facilities reporting**
  - include those that reported no cases
- **Total # of health facilities in the district**
- **Number & location of cases and deaths**
  - report suspected as well as confirmed
- **Number of vaccinations given and planned**

## **Response - Zero Reporting**

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- **"Zero reporting" = send a report even if no cases or deaths occurred**
  
- **Distinguishes between areas**
  - that really had no cases
  - that did not send a report
  - from which the report did not arrive
  
- **Helps evaluate effectiveness of vaccination campaign**

## **Response - Vaccination Plan Strategy**

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- **Ideal = vaccinate all susceptibles**
- **If resources are limited = focus on areas and groups at highest risk**
- **Use age- and sex-specific attack rates to determine *groups* at highest risk**
- **Use investigation results to determine *areas* at highest risk**

## 17D Yellow Fever Vaccine

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- One dose protects adults for life and children under four years for 10 years
- Do not vaccinate infants under 9 months
- *During epidemics*, vaccinate ages 12 months and older
- *During epidemics*, vaccinate pregnant women

## **Calculate Number of Vaccine Doses Needed**

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- 1. Determine population most at risk using age-specific attack rates**
- 2. Multiply number at risk by 1.17**  
*(this is the wastage factor)*
- 3. Multiply result by 1.25**  
*(number of reserve doses is 25%)*
- 4. Result = number of doses to order**

## Vaccination Team

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***All members must be vaccinated***

- 1 supervisor**
- 2 vaccinators**
- 2 clerks**
- 1 cold chain technician**
- 1 driver**
- community representatives / translators**
  - or smaller 4 person team that rotates duties**

## **Vaccine Storage and Handling**

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- **17D vaccine should be frozen on arrival**
  - if not, discard it
- **Store frozen vaccine at 0 degrees, or lower**
- **Keep frozen until reconstituting for use**
- **Reconstituted vaccine**
  - keep it cold
  - keep it out of the sun
  - use it within 2 hours

## **Document Vaccination Campaign**

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- **Record dose and date on a vaccine card**
- **Use EPI, Tetanus Toxoid or special YF card**
- **Tally doses given, by age group**
- **Report numbers and ages vaccinated daily**

## **Reduce Mosquito Populations**

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- **Protect household water**
  - remove larvae
  - cover all water containers
- **Search for & eliminate water "containers" (tires, bottles, gourds, rubbish)**
- **Spray the inside of houses**

## **Prevent Spread of Yellow Fever in Health Facilities**

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- **Use bed nets with all suspected YF patients**
- **Protect all water containers from mosquitoes**
- **Eliminate all mosquito breeding places nearby**
- **Eliminate adult mosquitoes**
- **Vaccinate all staff**

# **Informing the Public**

## **Everyone Should Know**

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- **Symptoms of yellow fever**
- **Where to go for treatment**
- **Where & when to go for vaccination**
- **How to reduce mosquito population**

# **Mosquitoes Spread Yellow Fever**

Follow These Rules to Protect Yourself

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- **Get vaccinated against yellow fever**
- **Rid your home of mosquitoes**
- **Use mosquito bed nets**

This is an example of a health education message.

Adapt messages to local circumstances.

Translate messages into local languages

## Get Vaccinated Against Yellow Fever

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- Vaccination prevents yellow fever
- Go to \_\_\_\_\_ for vaccination.
- Vaccination will be offered on \_\_\_\_\_  
from \_\_\_\_ o'clock to \_\_\_\_ o'clock.
- Bring your vaccine cards (EPI or TT)

This is also an example of a health education message.  
Insert the times and place for vaccination.

## **Store Drinking Water Safely**

### **For Prevention of YF and Diarrhea**

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- **Store water in a clean container**
  - with a lid
  - with a small opening
  
- **Use water within 24 hours**
  
- **Clean the container every day**
  
- **Pour water *from* the container -  
do not dip into it**

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3. Lecture: Clinical Management of Yellow Fever

Give a lecture on the clinical presentation and management of yellow fever, using the prepared overhead projector transparencies. There are reduced versions of the transparencies on the following pages.

Answer any questions.

# Clinical Management of Yellow Fever

**CDC**  
Centers for Disease  
Control and  
Prevention

# Yellow Fever

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- **Acute viral infection**
- **Transmitted by mosquitoes**
- **Endemic and epidemic in Africa**
- **High CFR in classic yellow fever**
- **No curative medical treatment**
- **Preventable by vaccination**

## **Clinical Yellow Fever**

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- **No protracted carrier stage**
- **No direct person to person contact**
- **3-6 day incubation period**
- **Patient is viremic 3-6 days after onset of fever**
- **Wide clinical spectrum of disease**
- **Easily confused with other causes of fever**

## **Spectrum of Clinical Illness**

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- **Undifferentiated febrile illness**
  - resembles many other fevers
  
- **Classic Yellow Fever**
  - fever, vomiting, epigastric pain
  - prostration, dehydration
  - scleral icterus
  - renal and hepatic abnormalities
  - hemorrhagic tendency
  - GI bleeding - black vomitus**

## Phases of Clinical Yellow Fever

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- **Phase 1- *nonspecific febrile illness***
  - *viremic patient, but diagnosis difficult*
- **Period of Remission**
  - *brief clinical improvement*
  - *3rd-4th day after onset*
- **Phase 2 - "intoxication"**
  - *hepatic and renal dysfunction*
  - *bleeding*
- **50% case fatality rate for severe YF**

## **Suggestive Physical Signs**

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- **Fever is almost always present**
- **Faget's sign - relative bradycardia**
  - **slow heart rate in relation to fever**
- **Conjunctival congestion**
- **Flushing of face and neck**
- **Tongue reddened at end and margins**
- **Minor gingival hemorrhages**

## **YF Case Management - 1**

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- **No curative therapy exists**
- **Good supportive care vital**
- **Prevent or correct dehydration and electrolyte imbalance**
- **Treat other infections**
- **Give paracetamol, not aspirin (aspirin may aggravate bleeding)**

## **YF Case Management - 2**

- **Give anti-emetics and anti-convulsants, if indicated**
- **Use bed nets for all suspected YF patients**
- **Do not transfuse routinely**
  - **use the haematocrit in well hydrated patients as a guide**
  - **will not help seriously ill patients in shock, or those with severe liver damage**

## **Record Patient Information**

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- **Diagnosis**
- **Date of consultation and of onset of symptoms**
- **Age, sex, address**
- **Specimens obtained**
- **Treatment**
- **Outcome**

## **Prevent Spread of Yellow Fever in Health Facilities**

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- **Use bed nets with all suspected YF patients**
- **Protect all water containers from mosquitoes**
- **Eliminate all mosquito breeding places nearby**
- **Eliminate adult mosquitoes**
- **Vaccinate all staff**

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4. Small Group Exercise: Exercise 5 - Clinical Management of Yellow Fever

- a) Divide the participants into three groups, taking into account their training and clinical experience.

Group 1: “Small Clinic Group”

Group 2: “Hospital Group”

Group 3: “Temporary Treatment Center Group”

- b) Explain the exercise by telling participants:

√ you will work in groups to plan how to care for two patients who may have yellow fever — the patients are described in Exercise 5 in the *Exercise Book*

√ imagine that you are a nurse, doctor or medical assistant, taking care of patients who come to the type of health facility you are assigned to

√ in planning care for these patients, you must limit yourself to equipment, supplies, and other staff that would *realistically* be available at that sort of health facility (you may assume that a limited number of extra supplies may be available during an epidemic.)

√ there are two purposes for this exercise:

(1) to review the decisions health workers must make about patient care, and

(2) to help you think about what resources would be needed in your area to actually care for many patients with yellow fever.

√ after about 15-20 minutes, each group will briefly explain how they would care for the patients — the presentation should include the answers to the questions listed in Exercise 5.

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- c) Ask participants to get out their *Guidelines*, and tell them that the information they will need in this exercise is found in Sections 2.1, 2.2, 2.3, and 4.9. They may use the *Guidelines* to look up answers. Ask them to open their *Exercise Books* to Exercise 5 for the description of the patients. They should write answers in the *Exercise Book*.
- d) Allow the groups about 15-20 minutes for “taking care of their patients”. Circulate while they are working, and be sure that they all understand the assignment. Offer help to those who need it.

Listen to the discussion as groups work, to be sure that they are *realistic* in the care they are planning.

- e) Allow about ten minutes for each group to explain how they cared for the two patients (about 6 minutes for presentation and 4 minutes for questions and discussion). Suggested answers are listed in *italics* on the next page.

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## EXERCISE 5 - CASE MANAGEMENT

### CASE HISTORY # 1 - MARY

There is a yellow fever epidemic in your area. Twenty-four-year-old Mary comes to you complaining of a headache, muscle aches and vomiting. She became ill yesterday. When you examine her, she appears ill and has a fever of 39.5.

- 1) Does Mary have yellow fever?

*It is not possible to decide whether Mary has yellow fever or not, based on this information.*

- 2) Does she meet the case definition for suspected yellow fever?

*No, she does not meet the case definition for suspected yellow fever. She does have some signs and symptoms that are compatible with yellow fever, but they are compatible with some other diseases as well.*

- 3) What other clinical information would you like?

Physical Examination

- ✓ *Correct answers are any of the signs mentioned as suggestive in Section 2.2 of the Guidelines.*

Clinical Laboratory

- ✓ *The results of a malaria smear, if there is malaria in the area.*  
✓ *Other tests are usually not suggestive this early in the illness.*

History

- ✓ *Has Mary been vaccinated against yellow fever?*

- 4) Mary's malaria smear is negative and you can find no other cause for her illness. You think that she may have yellow fever. She appears uncomfortable, but is alert and in no distress. What do you tell Mary?

- ✓ *You do not need to be admitted to hospital.*  
✓ *You may have yellow fever, or you may have another disease.*  
✓ *Take paracetamol for your headaches, muscle aches and fever. Do not take aspirin.*  
✓ *Rest in bed until you are well.*  
✓ *Drink plenty of fluids and try to eat small frequent meals.*  
✓ *Use a bed-net to prevent mosquito bites.*  
✓ *Return to the clinic immediately if you get worse, or if you are not better in 2-3 days.*

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### **CASE HISTORY # 2 - HENRY**

There is a yellow fever epidemic in your area. Ten-year-old Henry is brought to you by his mother. She said that four days ago he had a high fever and was treated for malaria. He improved for a few hours, but she has brought him back because the fever returned, his eyes have become yellow and his gums are bleeding. He has vomited frequently, and there are black flecks in the vomit. Henry seems very ill, and moves about restlessly on the bed. He says he is thirsty, but seems too weak to drink. His skin pinch goes back very slowly. He weighs 30 kg.

- 1) Does Henry have yellow fever?

*His illness is consistent with yellow fever, but it is not certain without laboratory confirmation.*

- 2) Does he meet the case definition for suspected yellow fever?

*Yes, he had a fever, followed by jaundice and bleeding gums. The black flecks in his vomit suggest GI bleeding.*

- 3) What other clinical information would you like?

*Physical examination - See Section 2.2*

*Clinical laboratory - See Section 2.3*

- 4) Henry's malaria smear shows falciparum malaria. Nonetheless, because there is a yellow fever epidemic in the area, you suspect that he also has yellow fever. How will you treat him (what orders will you write?)

- √ *Admit to hospital*
- √ *Absolute bed rest*
- √ *Give paracetamol for fever*
- √ *Give the antimalarial recommended for falciparum malaria in the area*
- √ *Give diazepam for restlessness*
- √ *Give an antiemetic for vomiting*
- √ *Monitor hydration status*
- √ *Give IV fluids, followed by oral fluids when patient is able to drink*
- √ *Provide a bed-net, to prevent mosquito bites*
- √ *See Section 4.9 for additional suggestions*

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- 5) After one day, Henry seems worse. He has been vomiting digested blood (black vomitus) and although he is not urinating much, there is blood in his urine. How would you decide if he needs a transfusion?

*See section 4.9*

*Assess the hematocrit when he is well-hydrated*

*Assess his general condition - transfusion may not help severely ill patients*

## 5. Discussion - Response to Yellow Fever Epidemics

Lead a discussion about participants' experiences in responding to an epidemic of yellow fever. If they have not been involved in responding to an epidemic of yellow fever, ask them to think of other epidemics they may have been involved with.

Devote about five minutes to each of these topics (some will take less time, and others, such as vaccination, may take longer). If none of the participants has had first-hand experience with yellow fever, then shorten this whole discussion.

Beside each topic is a reference to where it is covered in the *Technical Guidelines on the Detection and Control of Epidemic Yellow Fever*. Refer to the *Guidelines* if there is confusion — do not take time to read about each topic, but let participants know where they can find the information later.

### Discussion topics

- √ Epidemic Committee (Section 4.2)
- √ Reporting of first Suspected Cases and Informing Authorities (Section 4.3)
  
- √ Mass Vaccination Campaign (Section 4.5, and Annex 3)

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- ⇒ obtaining vaccine
  - ⇒ training and organizing vaccination teams
  - ⇒ conducting the vaccinations
  - ⇒ record keeping during the campaign

√ Reporting of Cases during the Epidemic (Section 4.6)

√ Mosquito Control (Section 4.7)

- ⇒ were the vectors identified?
- ⇒ adult mosquito control and elimination of breeding sites
- ⇒ use of bed nets

√ Clinical management (Section 4.9)

Use a sheet of flipchart paper for each topic, and ask one participant to record key words from the answers on the flipchart.

Ask these questions to start the discussion:

- √ What were the successes?
- √ What were the problems?
- √ What lessons did you learn?
- √ Have you already acted on what you learnt?
- √ What kind of obstacles prevented an effective response?

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During the discussion, make or reinforce points by referring to previous epidemics in the country, and to the description of epidemic response in the article in the *Exercise Book*.

Praise the participants for past successes and their efforts. Remind them that the key to preventing early deaths in an epidemic is being prepared — being ready to respond before the epidemic.

## 6. Summary of Key Points

Ask a participant to summarize the key points, or briefly summarize them yourself.

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